Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

February 21, 2017

10 CFR 50.73

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1 and 2
Renewed Facility Operating License No. DPR-33, DPR-52
NRC Docket Nos. 50-259, 50-260

Subject: **Licensee Event Report 50-259/2017-001-00**

The enclosed Licensee Event Report provides details of the inoperability of the 4KV Shutdown Board C Degraded Voltage Signal Timer for longer than allowed by the Technical Specifications. The Tennessee Valley Authority is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(i)(B), as any operation or condition prohibited by Technical Specifications.

There are no new regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact M. W. Oliver, Acting Site Licensing Manager, at (256) 729-2636.

Respectfully,

S. M. Bono
Site Vice President

Enclosure: Licensee Event Report 50-259/2017-001-00 – Signal Timer for 4kV Shutdown Board C Inoperable for Longer Than Allowed by Technical Specifications due to Detached Restraining Strap

cc (w/ Enclosure):
NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

ENCLOSURE

Browns Ferry Nuclear Plant
Unit 1

Licensee Event Report 50-259/2017-001-00

Signal Timer for 4kV Shutdown Board C Inoperable for Longer Than Allowed by Technical Specifications due to Detached Restraining Strap

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See Enclosed

NRC FORM 366 (06-2016) **U.S. NUCLEAR REGULATORY COMMISSION**

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB: NO. 3150-0104 **EXPIRES: 10/31/2018**

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Browns Ferry Nuclear Plant, Unit 1	05000259	1 OF 6

4. TITLE

Signal Timer for 4kV Shutdown Board C Inoperable for Longer Than Allowed by Technical Specifications due to Detached Restraining Strap

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									BFN, Unit 2	05000260
12	21	2016	2017	- 001	- 00	02	21	2017	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
100	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Baruch Calkin, Licensing Engineer	(256) 614-6713

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO		N/A	N/A	N/A

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On December 21, 2016, at 1228 Central Standard Time (CST), during a performance of the 4KV Shutdown Board (SDBD) C Undervoltage and Time Delay Relay Calibration and Functional Test, personnel discovered a detached restraining strap on a 4kV SDBD C Degraded Voltage Relay Timer. At 1835 CST, Operations personnel declared the relay inoperable. The timer retaining strap was replaced, and the relay was declared operable on December 22, 2016, at 1251 CST.

A Past Operability Evaluation determined that the timer was inoperable from October 5, 2016, until December 22, 2016, exceeding the Technical Specification allowed outage time.

The most likely cause of this event was human error. Rounding of the screw attaching the retaining strap to the backplane of the electrical cabinet in which the timer was housed allowed the retaining strap to become detached. This deficiency was not corrected despite testing and Quality Control verification. Corrective Actions include replacing the retaining strap using a longer screw, identifying relays previously installed under similar plant modifications, and ensuring that work packages for future installation of relays with seismic retaining straps contain steps to obtain adequate screw engagement during strap installation.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Browns Ferry Nuclear Plant, Unit 1	05000-259	2017	- 001	- 00

NARRATIVE

I. Plant Operating Conditions Before the Event

At the time of discovery, Browns Ferry Nuclear Plant (BFN), Unit 1, was operating in Mode 1 at approximately 100 percent rated thermal power, and BFN, Unit 2, was operating in Mode 1 at approximately 99 percent power.

II. Description of Event

A. Event Summary:

On December 21, 2016, at 1228 Central Standard Time (CST), during a performance of surveillance requirement (SR) O-SR-3.3.8.1.2(C), 4KV Shutdown Board [ECBD](SDBD) C Undervoltage and Time Delay Relay Calibration and Functional Test, Protective Relay Group personnel discovered a detached restraining strap on the 4kV SDBD C Degraded Voltage Relay [RLY][27][2] timer [TMR] BFN-0-02-211-0002C.

At 1835 CST, Operations personnel declared 4kV SDBD C Degraded Voltage Relay timer inoperable and entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.8.1.A, with required actions to immediately verify by administrative means that the other two degraded voltage relay channels [CHA] and associated timers on the affected SD BDs are operable; and to place the degraded voltage relay channel in trip within fifteen days.

The timer retaining strap was replaced, and the SDBD was declared operable on December 22, 2016, at 1251 CST.

A Past Operability Evaluation (POE) determined that the relay was inoperable from October 5, 2016, until December 22, 2016, exceeding the TS allowed outage time.

B. Status of structures, components, or systems that were inoperable at the start of the event and that contributed to the event:

There were no structures, systems, or components (SSCs) whose inoperability contributed to this event.

C. Dates and approximate times of occurrences:

October 5, 2016	4kV SDBD C Degraded Voltage Relay installed under Work Order 118393397
December 21, 2016, at 1228 CST	Protective Relay Group discovered a detached restraining strap on the 4kV SDBD C Degraded Voltage Relay timer.
December 21, 2016, at 1835 CST	Operations personnel declared 4kV SDBD C Degraded Voltage Relay inoperable and entered TS LCO 3.3.8.1.A.
December 22, 2016, at 1251 CST	Operations personnel declared 4kV SDBD C Degraded Voltage Relay operable and exited TS LCO 3.3.8.1.A.

D. Manufacturer and model number (or other identification) of each component that failed during the event:

There were no component failures associated with this event.

E. Other systems or secondary functions affected:

There were no other systems or secondary functions affected.

F. Method of discovery of each component or system failure or procedural error:

There were no component failures, system failures, or procedural errors associated with this event. Maintenance personnel discovered the condition while performing a surveillance on the affected equipment.

G. The failure mode, mechanism, and effect of each failed component, if known:

There were no component failures associated with this event.

H. Operator actions:

- Operations personnel declared 4kV SDBD C Degraded Voltage Relay inoperable and entered TS LCO 3.3.8.1.A.
- Operations personnel declared 4kV SDBD C Degraded Voltage Relay operable and exited TS LCO 3.3.8.1.A.

I. Automatically and manually initiated safety system responses:

There were no safety system responses initiated in response to this event.

III. Cause of the event:

A. The cause of each component or system failure or personnel error, if known:

The most likely cause of this event was the failure to identify rounding of the screw attaching the retaining strap to the backplane of the electrical cabinet [CAB] in which the timer was housed by personnel who installed, calibrated, and tested the retaining strap. The rounded screw allowed the retaining strap to become detached and remain in this condition for an extended period of time.

B. The cause(s) and circumstances for each human performance related root cause:

The cause of the human performance errors which most likely led to this event has not been identified, but is most likely a lack of procedural guidance for ensuring that sufficient thread engagement exists between the retaining strap screw and the the backplane of the electrical cabinet.

IV. Analysis of the event:

The Tennessee Valley Authority (TVA) is submitting this report in accordance with 10 CFR 50.73(a)(2)(i)(B), as any operation or condition which was prohibited by the plant's TS.

This event was most likely the result of the retaining strap screw, which secures the retaining strap to the body of the electrical cabinet in which the timer is housed, becoming detached due to rounding of its threads. The retaining strap is required to be attached in order for the timer to be seismically qualified because seismic testing of this component was performed with the retaining strap attached. With no retaining strap in place, the timer was considered inoperable due to its seismic test configuration not being met.

A POE determined that the timer was inoperable from October 5, 2016, at 0852 CST until December 22, 2016, at 1251 CST. TS LCO 3.3.8.1 requires in Modes 1, 2, and 3, that the Loss of Power (LOP) instrumentation for each Table 3.3.8.1-1 Function on 4kV SDBDs A, B, C, and D shall be operable. Timer BFN-0-02-211-0002C is the 4-second time-delay relay listed in the LOP table under function 2.b.2, and is therefore required to be operable when BFN, Units 1 and 2,are in Mode 1. Required Action B.1 requires, with two or more degraded voltage relay channels inoperable on one or more SDBDs or one or more associated timers inoperable on one or more SDBDs, and with operable loss of voltage relay channels on the affected SDBDs, that the degraded voltage relay channel be placed in trip within ten days. Required Action E.1 requires that, with any required action and associated completion time not met, that the associated Diesel Generator [DG](DG) be immediately declared inoperable. The timer was inoperable for approximately seventy-eight days without these Required Actions being completed. Therefore, BFN, Units 1 and 2, were in violation of Required Actions B.1 and E.1.

Due to Required Action E.1, DG C was inoperable from October 15, 2016, ten days after the 4kV SDBD C Degraded Voltage Relay timer became inoperable in accordance with the required completion time of TS LCO 3.3.8.1.B.1, to December 22, 2016, when the timer was declared operable. This was not recognized at the time. During this time period there were two instances where an additional Unit 1 and 2 DG was inoperable in Mode 1 for longer than two hours, as listed below:

- DG A – November 20, 2016 to November 23, 2016
- DG D – December 13, 2016 to December 17, 2016

TS LCO 3.8.1 requires that Unit 1 and 2 DGs, with two divisions of 480V load shed logic and common accident signal logic operable, shall be operable in Modes 1, 2, and 3. Required Action H.1 requires that, with two or more Unit 1 and 2 DGs inoperable, that all but one Unit 1 and 2 DG be restored to operable status within two hours. In both instances a second DG was inoperable

for greater than thirty-eight hours. If the Required Actions and associated Completion Times are not met, Condition I requires the Unit to be placed in Mode 3 within 12 hours and Mode 4 within 36 hours. Because two Unit 1 and 2 DGs were inoperable for longer than 2 hours and Units 1 and 2 were not placed in Mode 3 within twelve hours or in Mode 4 within thirty-six hours, BFN Units 1 and 2 were in violation of Required Actions H.1, I.1, and I.2.

Based on the initial understanding of the issue, Operations personnel declared the 4kV SDBD C Degraded Voltage Relay inoperable and entered TS LCO 3.8.1 Condition A. This understanding was incorrect in that the UNID given in the Operations Logs and subsequent repair work performed was for the 4kV SDBD C Degraded Voltage Timer instead of the relay itself. Therefore the TS LCO which was entered, LCO 3.3.8.1 Condition A, was not the correct LCO for this event. Condition B should have been entered instead of Condition A. Condition A was entered on December 21, 2016, and exited on December 22, 2016, which meets the associated ten-day completion time for Required Action B.1 as well. However the POE determined that the overall amount of time that the timer was inoperable still exceeded TS limits. This discrepancy has been entered into the Corrective Action Program (CAP) as Condition Report (CR) 1262246.

V. Assessment of Safety Consequences

This event resulted in BFN, Unit 1, 4kV SDBD C Degraded Voltage four-second time delay relay channel being inoperable for longer than allowed by the TS without performing Required Actions. If a seismic event substantial enough to adversely impact the function of this timer were to occur concurrent with a degraded voltage on 4KV SDBD C, DG C would not automatically start based only on degraded voltage. However, an accident signal and/or a complete loss of voltage at 4KV SDBD C would still have started DG C. All manual DG C start functions were also available.

A Probabilistic Risk Assessment was performed during the period of the timer's inoperability, and found that the change in Incremental Core Damage Probability and the change in Incremental Large Early Release Probability for the time period that the timer was inoperable correspond to a negligible increase in risk. Based on the above, TVA has concluded that, during the time period that the timer was inoperable, there was no significant risk to the health and safety of the public or plant personnel for this event.

A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event:

No components or systems failed due to this event.

B. For events that occurred when the reactor was shut down, availability of safety-related systems or components:

This event did not occur when the reactor was shut down.

NARRATIVE

C. For failure that rendered a train of a safety system inoperable, estimate of the elapsed time from the discovery of the failure until the train was returned to service:

This event did not render any safety systems inoperable.

VI. Corrective Actions:

The immediate Corrective Action (CA) was to generate a work order and replace the retaining strap.

Further CAs that are being managed by TVA's CAP under CR 1244680 include the following:

1. Identify DG relays that have or will be replaced by plant modifications similar to that which replaced relay BFN-0-02-211-0002C.
2. Ensure that work packages for future installation of relays with seismic retaining straps contain steps to obtain adequate screw engagement during strap installation.

VII. Previous Similar Events:

A review of the BFN CAP and Licensee Event Reports for Units 1, 2, and 3 revealed no instances of timer retaining straps becoming detached over the last three years.

VIII. Additional Information:

There is no additional information.

IX. COMMITMENTS

There are no new commitments.